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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/034,296	12/21/2001	Christopher J. Stepanian	ASPEN 113 US	9746

7590 07/16/2003

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EXAMINER

BOYD, JENNIFER A

ART UNIT	PAPER NUMBER
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1771

DATE MAILED: 07/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/034,296	STEPANIAN ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Jennifer A Boyd	1771	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 December 2001.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-48 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-48 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Claim Objections***

1. Claim 10 is objected to because of the following informalities: the claim has the phrase "less than" written twice on line 2. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 34 and 36 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
4. Claims 34 and 36 are indefinite because it is unclear whether the heat sink is being claimed and a part of the system. For the purpose of examination at this time, the Examiner will assume the limitations of a heat sink and a device which converts the thermal energy to electrical energy is for intended use.

### ***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this

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subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1 – 4, 7 – 8, 11, 19, 25 – 28, 31 – 32, 37 – 39, 42 – 43 and 48 are rejected under 35 U.S.C. 102(e) as being anticipated by Frank et al. (US 2003/0077438).

Frank is directed to a composite aerogel material that contains fibers (Title).

As to claim 1, Frank teaches a composite material that contains 5 – 97% by volume of aerogel particles and at least one fiber material (Abstract), equated to Applicant's "reinforcing structure". The fibers can be in the form of wadding (page 2, [0020]) which is known to be a lofted layer of fibers used for padding or stuffing.

As to claim 2, Frank teaches that the aerogels can be inorganic or organic (page 2, [0028]).

As to claim 3, Frank teaches that the aerogels can be based on Si or Al compounds (page 2, [0028]), which would encompass alumina and silica.

As to claim 4, Frank teaches that the aerogels can be melamine formaldehyde condensates (page 2, [0028]).

As to claim 7 - 8, Frank teaches that the composite can contain an iron oxide which is considered in the art to be a dopant (page 2, [0029]).

As to claim 11, Frank teaches that the preferred fibers have diameters that are between 0.1  $\mu\text{m}$  and 1 mm (page 2, [0023]) and can be crimped (page 2, [0020]).

As to claim 19, Frank teaches a composite material that contains 5 – 97% by volume of aerogel particles and at least one fiber material (Abstract), equated to Applicant's "reinforcing structure". It should be noted that Frank teaches *at least one* fiber material, therefore, the reinforcing structure can contain more than one type of fiber. Frank teaches that the fibers can be

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natural fibers, synthetic, inorganic fibers such as glass, mineral, silicon carbide or carbon fibers (page 2, [0019]). In one embodiment, the reinforcing structure can contain copper fibers and batting-type fibers such as natural or synthetic fibers. The fibers have diameters between 0.1  $\mu\text{m}$  and 1 mm (1,000  $\mu\text{m}$ ) (page 2, [0023]). The fibers have a length greater than the mean diameter of the aerogel particles, therefore, they must be at least 0.5 mm (or 500  $\mu\text{m}$ ). It should be noted that the aspect ratio is the ratio between the length of a fiber and the diameter of the fiber. Using the parameters given by Frank, the aspect ratios will range from 0.5 – 5000, which satisfies the Applicant's requirement. The fibers can be in the form of wadding (page 2, [0020]) which is known to be a lofted layer of fibers used for padding or stuffing.

As to claim 25, 37, and 48, Frank teaches that carbon fibers can be used in the reinforcing structure.

As to claim 26, Frank teaches that mixtures of the types of fibers can be used (page 2, [0025]) implying that the material, size, aspect ratio or microfiber quantity can vary.

As to claim 27, Frank teaches that a covering layer(s), equated to Applicant's "material having high thermal conductivity", can be attached to at least on side of the composite (page 3, [0048]). Frank teaches that the covering layer has a thermal conductivity between 10 and 100 mW/mK (page 4, [0053]).

As to claims 28 and 31, Frank teaches that the covering layer(s) can be a metal film (page 4, [0049]). It is known in the art that a film is a type of sheet material.

As to claim 32, Frank teaches that the fibers can be in the form wadding (page 2, [0020]), which would have fibers orientated in some sort of fashion.

As to claims 38 – 39 and 42 - 43, the limitations of the invention are discussed above.

***Claim Rejections - 35 USC § 102/103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 5, 20 – 24, 33 - 36, 40 – 41, 44 and 45 - 47 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Frank et al. (US 2003/0077438).

Although Frank does not explicitly teach the claimed fibers having a thermal conductivity of less than 50 mW/mK as required by claim 5, the microfibers are comprised of a material having a thermal conductivity below about 200 mW/mK as required by claim 20, the microfibers are comprised of a material that resists sintering more than the lofty fibrous batting as required by claim 21, the microfibers are comprised of a material that reduces the transmission of infrared radiation through the composite more than the lofty fibrous batting as required by claim 22, the microfibers are comprised of a material that attenuates radio frequency waves as required by claim 23, the microfibers are comprised of one or more materials that attenuate electromagnetic waves as required by claim 24, the high thermal conductivity conducts heat away from a localized heat load and emits it to the environment as required by claim 33, 35, 44, and 46 and high thermal conductivity material is a metal which is sufficiently malleable to provide conformability to the composite to enable the composite to retain its shape after bending as

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required by claim 40, it is reasonable to presume that fibers having a thermal conductivity of less than 50 mW/mK as required by claim 5, the microfibers are comprised of a material having a thermal conductivity below about 200 mW/mK as required by claim 20, the microfibers are comprised of a material that resists sintering more than the lofty fibrous batting as required by claim 21, the microfibers are comprised of a material that reduces the transmission of infrared radiation through the composite more than the lofty fibrous batting as required by claim 22, the microfibers are comprised of a material that attenuates radio frequency waves as required by claim 23, the microfibers are comprised of one or more materials that attenuate electromagnetic waves as required by claim 24, the high thermal conductivity conducts heat away from a localized heat load and emits it to the environment as required by claim 33, 35, 44, and 46, and high thermal conductivity material is a metal which is sufficiently malleable to provide conformability to the composite to enable the composite to retain its shape after bending as required by claim 40 is inherent to Frank. Support for said presumption is found in the use of like materials (i.e. lofted batting with aerogel material and carbon microfibers) which would result in the claimed property. The burden is upon the Applicant to prove otherwise. *In re Fitzgerald* 205 USPQ 594. In addition, the presently claimed property of fibers having a thermal conductivity of less than 50 mW/mK as required by claim 5, the microfibers are comprised of a material having a thermal conductivity below about 200 mW/mK as required by claim 20, the microfibers are comprised of a material that resists sintering more than the lofty fibrous batting as required by claim 21, the microfibers are comprised of a material that reduces the transmission of infrared radiation through the composite more than the lofty fibrous batting as required by claim 22, the microfibers are comprised of a material that attenuates radio frequency waves as required by



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claim 23 and the microfibers are comprised of one or more materials that attenuate electromagnetic waves as required by claim 24, the high thermal conductivity conducts heat away from a localized heat load and emits it to the environment as required by claim 33, 35, 44, and 46 and high thermal conductivity material is a metal which is sufficiently malleable to provide conformability to the composite to enable the composite to retain its shape after bending as required by claim 40 would obviously have been present once the Frank product is provided. Note *In re Best*, 195 USPQ at 433, footnote 4 (CCPA 1977) as to providing of this rejection made above under 35 USC 102.

As to claims 34, 36, 45 and 47, it should be noted that the heat sink and device which converts the thermal energy to electrical energy are regarded as limitations which establish intended use, therefore, are not given patentable weight.

As to claim 41, the limitations of the patent are discussed above.

### ***Claim Rejections - 35 USC § 103***

9. Claim 6, 9 - 10, 12 - 18, 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Frank et al.

As to claims 6, 9, 10, 12, 17 and 18, Frank discloses the claimed invention except for the lofty batting has a sufficient quantity of fibers in its z axis to provide loft yet not so many that the insulating properties are compromised by the z axis fibers acting as thermal conduits as required by claim 6, the dopant is present in an amount of 1 - 20% by weight of the total composite as required by claim 9, the cross-sectional area of the fibers of the batting visible in a cross-section of the composite is less than 8% of the total surface area as required by claim 10 or less than



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10% as required by claim 12 of that cross section, the batting has a density of about 0.1 to 16 lbs/ft<sup>3</sup> as required by claim 17 and the batting has a density of about 2.44 to 6.1 lbs/ft<sup>3</sup> as required by claim 18. It should be noted that the quantity of fibers, amount of dopant, cross-sectional area of fibers visible and batting density are result effective variables. For example, as the quantity of fibers and density increases, the batting becomes more lofted. As the amount of dopant increases, conductivity increases. As the visible cross-sectional area increases, the properties of the batting changes. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the lofty batting has a sufficient quantity of fibers in its z axis to provide loft yet not so many that the insulating properties are compromised by the z axis fibers acting as thermal conduits as required by claim 6, the dopant is present in an amount of 1 – 20% by weight of the total composite as required by claim 9, the cross-sectional area of the fibers of the batting visible in a cross-section of the composite is less than 8% of the total surface area as required by claim 10 or less than 10% as required by claim 12 of that cross section, the batting has a density of about 0.1 to 16 lbs/ft<sup>3</sup> as required by claim 17 and the batting has a density of about 2.44 to 6.1 lbs/ft<sup>3</sup> as required by claim 18 since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In the present invention, one would have been motivated to optimize the density, amount of fibers in the z axis, level of dopant and surface area of fibers to create a composite with the proper level of conductivity and loft.

As to claims 13 and 14, the limitations are disclosed above.

As to claims 15 – 17 and 29, although Frank does not explicitly teach the claimed batting is compressible by a minimum of 50% of its thickness and is sufficiently resilient that after

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compression for about 5 seconds it returns to at least 75% of its original thickness as required by claim 15, compressible by at minimum of 65% and returns to at least 75% of its original thickness as required by claim 16 and 17, and the high thermal conductivity material is a metal which is sufficiently malleable to provide conformability to the composite to enable the composite to retain its shape after bending as required by claim 29, it is reasonable to presume that batting is compressible by a minimum of 50% of its thickness and is sufficiently resilient that after compression for about 5 seconds it returns to at least 75% of its original thickness as required by claim 15, compressible by at minimum of 65% and returns to at least 75% of its original thickness as required by claim 16 and 17, and the high thermal conductivity material is a metal which is sufficiently malleable to provide conformability to the composite to enable the composite to retain its shape after bending as required by claim 29 is inherent to Frank. Support for said presumption is found in the use of like materials (i.e. lofted batting with aerogel and conducting fibers) which would result in the claimed property. The burden is upon the Applicant to prove otherwise. *In re Fitzgerald* 205 USPQ 594. In addition, the presently claimed properties would obviously have been present once the Frank product is provided. Note *In re Best*, 195 USPQ at 433, footnote 4 (CCPA 1977) as to providing of this rejection made above under 35 USC 102.

As to claim 30, Frank teaches that the covering layers can be made of metal films (page 4, [0049]). Frank fails to teach that the metal films can be made from copper or steel. It would have been obvious and necessary for one of ordinary skill in the art practicing the invention of Frank to provide the details of the metal film. As steel and copper are commonly known metals in the art which are malleable and have high thermal conductivity, it would have been obvious to

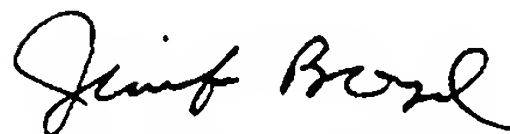
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one of ordinary skill in the art at the time the invention was made to use steel or copper films in the invention of Frank, motivated by the expectation of successfully practicing the invention of Frank.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A Boyd whose telephone number is 703-305-7082. The examiner can normally be reached on Monday thru Friday (8:30am - 6:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel Morris can be reached on 703-308-2414. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

  
Jennifer Boyd  
July 9, 2003

